

## CLAIMS

1. A process for producing a periodic structure, comprising the steps of:

preparing a working object which changes a property

5 thereof by photoreaction caused by an exciting energy;

generating a light having a photonic energy of intensity of one fraction of natural number divisions of the exciting energy by each of light sources of

10 light-source groups arranged regularly in two-dimensional arrangement; and

concentrating the light emitted from the light source group at each of light-concentrating points arranged at regular intervals in the working object to cause

15 photoreaction at and around the light-concentrating point to form a periodic structure comprised of regions each of which has a changed property in the working object.

2. The process for producing a periodic  
20 structure according to claim 1, wherein the photoreaction is a multiphoton absorption reaction.

3. The process for producing a periodic structure according to claim 1, wherein the lights from the light source group are introduced through a  
25 light-condensing optical system to the working object.

4. The process for producing a periodic structure according to claim 1, wherein the lights

from the light source group are coherent lights, and the lights from the light source group are interfered with each other in the working object, to make the lights concentrated.

5           5. The process for producing a periodic structure according to claim 1, wherein the lights from the light source group are generated by a single light-generating source.

10           6. The process for producing a periodic structure according to claim 1, wherein the light source group is comprised of a single light-generating source and a mask having fine pores arranged periodically in one plane, and the light from the light-generating source is introduced to one  
15 face of the mask and emitted from the other face thereof.

          7. The process for producing a periodic structure according to claim 1, wherein the light source group are comprised of a single light-  
20 generating source and a microlens array comprising microlenses arranged periodically in one plane, and the light from the light-generating source is introduced to one face of the microlens array and emitted from the other face thereof.

25           8. The process for producing a periodic structure according to claim 1, wherein the light source group is comprised of a single light-

generating source and an optical fiber bundle of  
optical fibers bundled regularly each of which fibers  
has a microlens on one end, and the light from the  
light-generating source is introduced to an end of  
5 the optical fiber bundle having no microlens, and  
emitted from the other end of the fiber bundle.

9. The process for producing a periodic  
structure according claim 1, wherein the periodic  
structure is formed in three dimensions by changing  
10 the relative position of the concentrated points and  
the working object.